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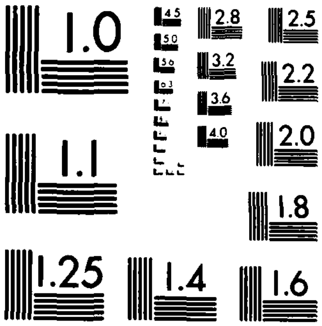

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MANAGEMENT CONSULTING & RESEARCH, INC.

TR-8202-1
VOLUME II

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SKILL TRAINING ANALYSIS: AN EXAMINATION OF THE NAVY PIPELINE MANAGEMENT SYSTEM

By

Rodney D. McConnell
Ann O. Buchanan
Stuart C. Johnson
Don H. Murdock

14 June 1983

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Prepared For:

Office of the Assistant Secretary of Defense
Manpower, Reserve Affairs and Logistics
Contract Number: MDA903-82-C-0278

Prepared By:

MANAGEMENT CONSULTING & RESEARCH, INC.
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Management Consulting & Research, Inc. (MCR) examined Service skill training conducted at the installation level and analyzed its impact on unit productivity. MCR also conducted a special purpose task that examined the Navy Pipeline Management System. Volume I of the report describes techniques developed for examining Air Force training and the linkage with maintenance productivity. It also describes the MCR examination of Army installation-level training and a brief discussion of

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the Army's training effectiveness analysis process. Volume II of the report contains an examination of the Navy training pipeline with specific examination of two Navy ratings: Aviation Electronics Technician and Electronics Technician.

PREFACE

Management Consulting and Research, Inc. (MCR) provided support to the Office of the Assistant Secretary of Defense (OASD) for Manpower, Reserve Affairs and Logistics (MRA&L) under contract number MDA903-82-C-0278 for the examination of skill training. MCR analyses will assist in the evaluation and support of Service training programs.

This technical report is a contract deliverable that documents the skill training analyses conducted for each task of this project. The report is provided in two volumes:

- Volume I, "Skill Training Analysis: The Linkage of Unit Level Skill Training and Unit Productivity," and
- Volume II, "Skill Training Analysis: An Examination of the Navy Pipeline Management System."

We would like to acknowledge the continuing guidance and assistance of Mr. Michael J. Kendall, COTR, of the Training and Education Directorate, and the assistance provided by other members of the OSD staff and the Military Service staffs.

EXECUTIVE SUMMARY

This summary includes the study purpose, organization of this report, and observations made in the course of the study.

A. STUDY PURPOSE AND REPORT ORGANIZATION

The purpose of this study was to analyze Service skill training conducted at the installation level and to analyze its impact on unit productivity. MCR also conducted a special purpose task which was to examine the Navy Pipeline Management System with emphasis on a specific critical skill. The four tasks we performed are listed below:

- Task 1 -- an examination of the impact of a Field Training Detachment (FTD) on Air Force operational unit productivity;
- Task 2 -- an examination of the impact of installation level training using simulators on F-16 unit maintenance productivity;
- Task 3 -- an examination of the impact of installation level training on Army operational unit maintenance productivity; and
- Task 4 -- an examination of the Navy Pipeline Management system.

This report, which documents our work, is divided into two volumes: Volume I, "Skill Training Analysis: The Linkage of Unit Level Skill Training and Unit Productivity," and Volume II, "An Examination of the Navy Pipeline Management System."

Volume I of the report describes the two tasks on Air Force installation-level skill training and the task on Army installation-level skill training listed above. In the first Air Force

task (described in Section II of Volume I), we developed two methods for linking skill training to maintenance productivity. In the second Air Force task (described in Section III of Volume I), we developed three techniques for examining the linkage between training and maintenance productivity. In the Army task (described in Section IV of Volume I), we examined Army installation level training. Section IV of Volume I also contains a description of the Army training effectiveness analysis process.

Volume II of the report contains an examination of the Navy training pipeline with specific examination of two Navy ratings: Aviation Electronics Technician and Electronics Technician.

B. OBSERVATIONS

The following observations were made in the course of our examination of skill training. The observations are grouped by each of the tasks we performed during the study.

- TASK 1: This task attempted to illustrate a verifiable, positive relationship between Field Training Detachment (FTD) training and job performance. Two methods were devised to illustrate this relationship: a Quality Assurance (QA) methodology, which compared individual performance evaluations in a statistical manner; and a Work Unit Code/Trend Analysis methodology, which compared average time to complete a like task between work centers. "Macro" measures of performance, such as the number of aircraft hours flown and the number of aborted flights due to mechanical problems, were not considered in this task. Although these measures might be more accurate maintenance performance measures, they are not directly relatable to training and could not be used. The results of our work in this task were not conclusive although they indicate that FTD training had some impact on productivity. The measures chosen did not capture significant differences, but this is explained by several biases that exist in the data that was used. This observation

is not to say that FTD training is ineffective in terms of teaching new job skills. One must realize that personnel who go through FTD training have already received extensive training in their specialty fields, and this additional unit training is a refinement, or "add-on" to their broad training base.

The advantages of FTD training are in three areas:

- capability of rapid adjustment to local requirements,

- cost savings based on little or no need to travel to distant schools for training, and

- rapid return of students to the job.

Unit training goals can be met through FTD schooling and through an on-the-job training (OJT) program. OJT allows work to continue without loss of students and instructors to the local school, but FTD training helps to get a person on the job at a particular skill level in a shorter period of time. This fact, combined with modest increases in productivity (measured either in quantity or quality of work), should produce higher levels of aircraft availability without an increase in the size of the work force. Any increase in aircraft availability yields readiness improvements. This may be the most important benefit of FTD training.

In the course of our research on the QA methodology, we had the opportunity to examine the work of the QA section at several wings. The wing commander, in his attempt to achieve the highest number of mission available aircraft, has a valuable tool in his QA section. This group of highly skilled maintenance personnel of varied skills performs an important function in its evaluation of individual mechanics. Our analysis included a sample of 2,180 personnel tested by the QA sections at our sample wings; 702, or 32%, failed to pass the QA certification. These personnel had to be retrained and then recertified by their supervisors that they were capable of performing their work. Thus, we found that the QA section furnishes real-time feedback on the capability of the maintenance personnel to perform their tasks. Our data shows that the QA program is viable and doing its job of insuring that maintenance is properly performed.

- TASK 2: Our analysis in this task used three techniques to examine productivity. Each technique produced some positive analytical results. The approaches used were: examine productivity by action code, examine productivity by frequency, and use of analysis of variance, or ANOVA.

  - The productivity by action code approach allowed us to examine the effect training had on productivity in a graphical form. The results appeared to show that for both of the work unit codes (WUCs) examined (primary flight control electronics - 14A00 and turbofan power plant - 23Z00), the effect of training is significant in terms of productivity increases. It was obvious in our "wing-to-wing" comparisons. The attempt to group work centers by training status (high, medium, or low) and thus infer some meaning concerning the effect of frequency, did not provide useful results. Any relationship, holding training relatively constant, between frequency and productivity was not obvious.

  - The productivity by frequency (actions per worker) approach plotted frequency versus productivity. A regression line was fitted to each plot and the results for WUC 14A00 showed, in four out of six cases (six action codes), a positive correlation (negative slope) between frequency and productivity. The results for WUC 23Z00 were not clear. We examined three action codes and in two cases got a negative correlation between frequency and productivity. One case resulted in a positive correlation. Overall, the technique appears to show a positive relationship between frequency and productivity.

  - The use of ANOVA allowed us to examine the impact of both frequency and training on maintenance productivity. The statistical results were mixed, since in three out of four tests it was not indicated that these results were indicative of the overall Air Force maintenance population at the 90% confidence level. However, it must be noted that training, in both WUC examinations, has a much larger effect on productivity than frequency. In the case of WUC 23Z00, there was a positive indication of a relationship between training and productivity at the 90% confidence level.

  - In order to assure ourselves that the amount of time spent by work centers on the actions we examined was representative, we did a limited

comparison of actions we examined to total actions worked on. There are 28 system level WUCs for the F-16. WUC 14000 was the highest manhour consumer in our sample (10.6%), WUC 23000 was fourth with 8.0%. There are seven subsystems within WUC 14000--WUC 14A00 was 32% or 3.4% of total wing manhours. There are twelve subsystems within WUC 23000--WUC 23Z00 was 24% of WUC 23000 or 2.0% of total wing manhours. Thus out of 113 subsystem WUCs the two WUCs we examined (14A00 and 23Z00) are quite representative of total wing maintenance since they consume over 5% of total maintenance manhours in the sample we looked at.

- Our intention was to show a relationship between maintenance productivity and installation-level training. We chose courses taught using simulators for our examination of training but did not compare simulator training with non-simulator training.

- TASK 3: In this task, data limitations reduced the scope of any conclusions that could be made with respect to the results of our analyses. No specific, quantitative observations or conclusions can be advanced concerning the relationship between installation-level maintenance training and productivity. Subjectively, installation-level training does seem to have a positive impact on maintenance productivity. Interviews were conducted with several individuals (ranging from mechanics to staff officers at the divisional level). All of these individuals had the same impression of installation-level training: although the positive benefit of the training may not be quantifiable, the benefit does exist. Mechanics were able to "diagnose problems better" and "perform troubleshooting actions with more accuracy" as the result of installation-level training (in this case, Detriot Diesel Allison courses).

  These subjective observations are all that can be said, at this time, concerning the relationship upon which this task has focused. Current databases from which information can be obtained for training/productivity analyses proved inadequate for a specific, quantitative analysis. Although the current databases are not appropriate for the kinds of analyses that we attempted, this will not necessarily be the case in the future. The Army is developing the systems to keep track of productivity information. When they are complete, the present type of analysis could be successful. In particular, the following data sources could provide appropriate information.

- The Maintenance Performance System (MPS). The Army Research Institute-developed MPS is currently in the test mode. As more data is collected by this system, and if the system is expanded so that data is collected at other Army installations, the system could prove to be a very effective training management tool, especially for the analyses of training and maintenance productivity.

- The Standard Army Maintenance System (SAMS). The SAMS is an automated maintenance management system that will replace The Army Maintenance Management System (TAMMS) and encompass all levels of Army material maintenance. SAMS will improve upon the present TAMMS system in that a maintenance job will be "tracked" on an in-shop computer as it progresses through work stages, and each different stage of work will be explicitly noted in the job record. Therefore, the records should be more accurate than those in TAMMS (which is automated at a much higher level) and include more detailed data on particular actions performed. Unfortunately, the SAMS system is not designed for training analysis purposes; no information that identifies individuals is included in this system. The system, however, is still in preliminary implementation stages. Data elements could theoretically be added to the system if a strong rationale were given for their inclusion. Even if individual identification were not included in the system, the improvements in accuracy and level of detail over the TAMMS database could be of benefit for training/productivity analyses. A "macro" level approach, which specifically identifies certain types of installation-level training with certain types of maintenance actions, would be much easier to accomplish if maintenance actions were identified more explicitly in an automated database. SAMS could provide this capability, whereas the current TAMMS does not.

- TASK 4: The Navy training pipeline is complex. Prior to fleet assignment, a new enlistee might attend as many as seven courses located at different schools. Mixing self-paced and group-paced fixed-length courses in the same pipeline can cause scheduling problems and student backlogs. A student may accelerate through one series of self-paced courses, only to have to wait for a start date for the next course if it is group-paced. The efforts of one school to solve its student backlog problem could contribute, however, to a student backlog for the follow-on course at another school.

In addition to alleviating student backlogs, coordination can eliminate redundant or inadequate instruction and can help reduce attrition and time spent in training. The electronics technician (ET) pipelines reflect several instances of apparently redundant training. To reinforce the fundamental skills taught in the basic electricity and electronics course, the Class "A" schools teach basic electrical principles and refresher mathematics. Although this training appears redundant and increases the time spent in school, it has reduced attrition at the follow-on courses by reinforcing necessary fundamental skills. Overall pipeline attrition is another factor of considerable importance in the examination of training for critical skills. The estimated FY82 cohort attrition percentages for the six Navy training pipelines included in this analysis were computed and are summarized below:

- Aviation Electronics Technician -- 19.7%

- Electronics Technician/Advanced Electronics Field/Strategic Weapons Systems Submariner -- 40.4%

- Electronics Technician/Nuclear Field -- 57.6%

- Electronics Technician/Advanced Electronics Field/Conventional Surface -- 39.5%

- Electronics Technician/Advanced Electronics Field/Navigation Submariner -- 50.5%

- Electronics Technician/Advanced Electronics Field/Electronics Warfare Submariner -- 40.1%

Overall attrition figures could key Navy planners to problems in the pipeline as a whole, as opposed to specific courses within a particular pipeline. If overall attrition figures are deemed to be too high, then efforts should be made to determine the exact cause of the attrition. Perhaps entrance requirements for the rating under consideration need to be raised or courses need to be re-evaluated. This would ensure that training funds are expended in a fashion that yields the highest number of qualified sailors at the end of the training pipeline.

The Navy has initiated efforts to improve pipeline management and reduce the time spent at Navy schools. Special attention has been given to those skill areas requiring electronics training. One key to better pipeline management is a simpler pattern of training: keep the number of courses and the various school locations to a minimum.

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LIST OF EXHIBITS

I. INTRODUCTION

This section discusses the following:

- Purpose,
- Background,
- Approach, and
- Organization of this Volume.

A. PURPOSE

This study examines the Navy Pipeline Management System with emphasis on the timing of enlisted initial skill training. This analysis was performed for the Office of the Assistant Secretary of Defense (OASD) for Manpower, Reserve Affairs and Logistics (MRA&L) as part of an overall study of skill training.

B. BACKGROUND

As part of a comprehensive review of military training, OASD (MRA&L) prepared a summary[1/] of the systems developed to train individuals in selected enlisted maintenance skills. The report covers the entire training pipeline from the schoolhouse to the field and focuses on skills that are fairly common among the Services. Among its major findings, the study identified problems of synchronizing capacity, scheduling, and course content in the Navy's training pipelines. The path for electronics maintenance training appeared especially complex.

1/Report on Individual Skill Training-Maintenance Training in the Department of Defense, OASD (MRA&L), May 1982.

Navy initiatives to reduce backlog in the training pipeline, specifically for the Electronics Technician (ET) rating, have increased course capacities in Class "A" Schools and various Class "A" Preparatory Schools. In order to assess the present status of the training pipeline, particularly for the ET rating, MCR was tasked to examine that area in detail. We have gathered detailed information on the various ET rating pipelines and the Aviation Electronics Technician (AT) rating pipeline.

MCR also received actual data from the Naval Military Personnel Command (NMPC) on the October-November 1980 ET cohort. This extract from personnel records provided us with date of entry in the service, date of receiving the ET3 rating, date of latest assignment, and schooling received. This information has been used to show whether inordinate delays exist in the pipeline.

C. APPROACH

The approach to this research task entailed:

- examining the Navy Pipeline Management System to determine inefficiencies and possible methods of alleviating them;
- examining specific ratings (e.g., Electronics and Aviation Electronics Technician);
- providing a detailed description of the pipelines, where current problems appear to exist, and possible solutions;
- computing an estimated FY82 cohort attrition percentage for each pipeline under consideration; and
- analyzing actual personnel data to determine how long it takes to get a rating, whether the actual pipeline resembles the theoretical pipeline, and whether inordinate delays exist.

D. ORGANIZATION OF THIS VOLUME

Following this introduction are five other sections of this Volume:

- Navy Training Pipeline,
- Aviation Electronics Technician (AT),
- Electronics Technician (ET),
- Evaluation of Actual Personnel Data, and
- Observations.

Section II describes the general flow of Navy training pipeline, including student backlogs. An explanation of the Navy Enlisted Occupational Classification System, ratings, rates, and advancement of enlisted personnel is included. Sections III and IV examine the training pipelines of two specific maintenance ratings, AT and ET. Course contents, course lengths, attrition rates, student backlogs, and a computation of an estimated FY82 cohort pipeline attrition percentage are addressed. Section V examines actual personnel data for the ET rating. Section VI provides observations on the training process and the difficulties associated with training pipelines. Supporting information is presented in two appendices:

- Reference Sources, and
- Recommendations by the Navy Study Group in the Report of the Study Group to Evaluate the Enlisted Training Backlog.

II. NAVY TRAINING PIPELINE

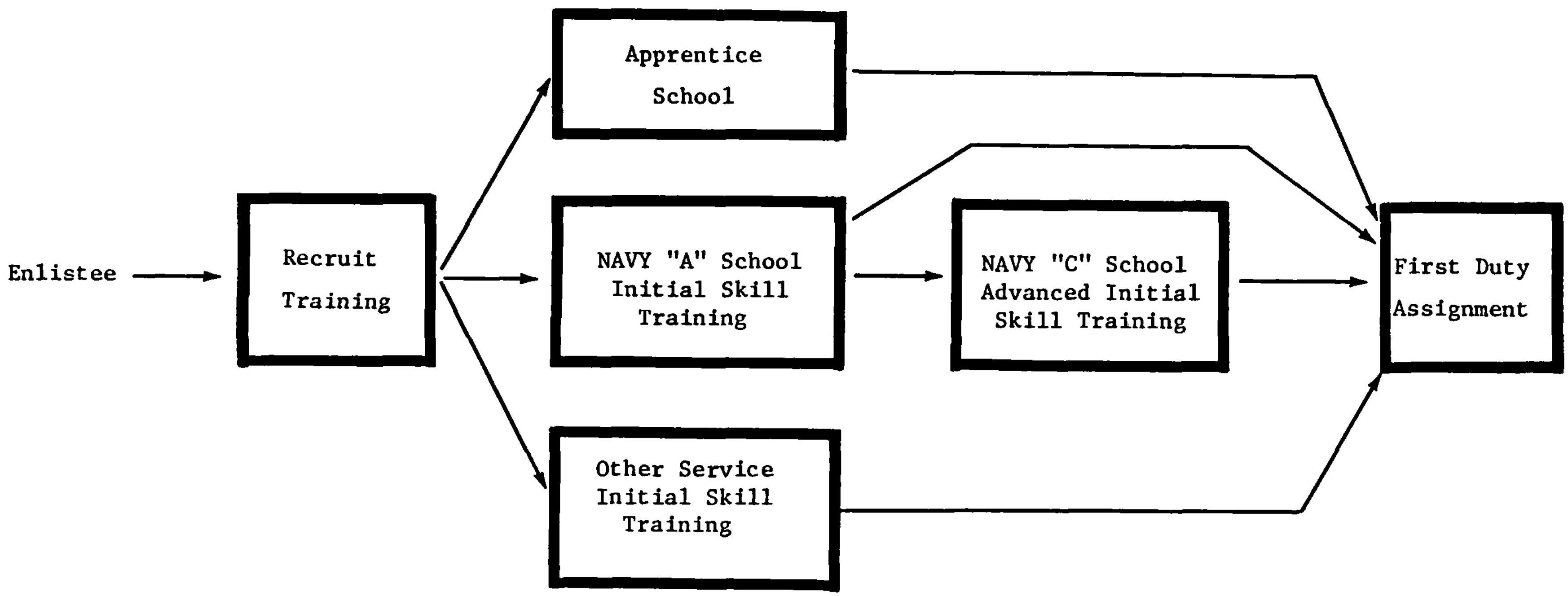
This section discusses the following topics:

- General Flow of the Navy Training Pipeline;
- Navy Enlisted Occupational Classification System (including ratings and rates);
- Procedures for Advancement of Enlisted Personnel; and
- Student Backlog.

A. GENERAL FLOW OF THE NAVY TRAINING PIPELINE

The term "training pipeline" refers to the entire sequence of courses (possibly located at different schools) which are required for qualification in specific military occupations. The typical training flows for active non-prior-service Navy enlisted personnel are depicted in Exhibit II-1. After graduating from Recruit Training, nearly all Navy enlisted personnel attend either Apprentice School or Class "A" School for Initial Skill Training prior to their first duty assignment or further training. A very small number of recruits go to other Services Initial Skill Training. All Navy Reserve trainees (USNR-R) attend Class "A" School.

An alternative training path is available through the Programmed School Input (PSI) plan. Under the PSI plan, a portion of the personnel recruited during the peak accession period (May to September) are sent directly to the fleet from the Recruit Training Center (RTC). After spending at least six months at the fleet, these "delayed-training" personnel are sent to school to begin their formal training. Thus, as a result of



Source: "An Assessment of the Methods Used to Determine Resource Requirements for Enlisted Initial Entry Training," R. McConnell, et al., TR-8001-1, Management Consulting & Research, Inc., May 1980.

Exhibit II-1. TYPICAL TRAINING PATHS OF NAVY ENLISTED PERSONNEL

the PSI plan, the "delayed-training" personnel begin their Initial Skill Training sometime during the February to March time frame, when the smallest quantity of recruits come on board. Those recruited during February or March begin Initial Skill Training immediately after Recruit Training. The PSI plan is followed when adequate space is not available in the Initial Skill Training schools for various specific ratings, such as Aviation Electronics Technician (AT). The Electronics Technician (ET) rating is not included in the PSI plan.

The Chief of Naval Education and Training (CNET) is responsible for initial entry training (Recruit, Apprentice, and Class "A" School) as well as most other Navy individual training. Recruit Training is 7.7 weeks long and is conducted at three Recruit Training Commands (RTCs) located at Great Lakes, Illinois; San Diego, California; and Orlando, Florida. Recruits are taught the basic skills and knowledge needed to adapt to Navy life and to prepare for follow-on training.

Upon completion of Recruit Training, an individual receives some form of Initial Skill Training, either Apprentice or Class "A" School. Apprentice Training prepares Recruit Training graduates for direct assignment to the fleet in one of three apprentice ratings: Airman (AN), Fireman (FN), or Seaman (SN). Class "A" Schools provide the basic technical knowledge and skills required for entry level job performance and further specialized training. Class "A" Schools are operated at many locations across the country and offer about 180 courses, covering 82 enlisted personnel ratings.

After completing Class "A" School Training, an individual is either sent directly to the fleet or to Advanced Initial Skill Training at Class "C" Schools, which are located throughout the country. Most four-year obligated service (4YO) personnel go directly to the fleet. Class "C" Schools are attended mainly by six-year obligors (6YO) and by those individuals who have completed fleet or shore assignments and require additional advanced training in a particular specialty.

Class "C" Schools offer enlisted personnel two types of courses: Skill Progression courses which result in award of a Navy Enlisted Classification (NEC) and Functional Training courses (those lasting 13 days or longer) which do not result in award of an NEC. NECs identify skills which require more specific identification than is provided by rates and ratings. Functional Training cuts across various specialties and provides additional required skills without changing an individual's primary specialty or skill level.

The following factors affect the training path, or student pipeline flow:

- cyclic loading (e.g., due to seasonal recruiting patterns),
- course attrition rates,
- quantity and quality of instructors,
- quantity and quality of students,
- mix of self-paced and fixed-length courses,
- course modifications (e.g., course length and scheduled frequency),

- changes in skills required, and
- student backlog (e.g., time spent awaiting entry to training, processing time, weekends, holidays).

Based on historical data, the Chief of Naval Education and Training (CNET) is developing a deterministic model to predict the flow of courses. The model's Pipeline Management File will identify and provide monitoring of selected training pipelines.

B. NAVY ENLISTED OCCUPATIONAL CLASSIFICATION SYSTEM

General ratings are broad career fields for enlisted personnel. These ratings are grouped by similar duties, functions, and qualifications, and are shown on Exhibit II-2. A rating is subdivided by paygrade into six rates: master chief, senior chief, chief petty officer, and first, second and third class petty officers, corresponding to pay grades E-9 through E-4, respectively. Personnel in pay grades E-3, E-2, and E-1 are normally assigned general rates (apprenticeships) which indicate eligibility for entry into various ratings.

The Navy Enlisted Occupational Classification System consists of three major subsystems: Enlisted Rating Structure, Special Qualifications, and Navy Enlisted Classification (NEC) Structure. The Enlisted Rating Structure deals with rates and ratings that are the core for enlisted career development. Special Qualifications identify several highly specialized skills which cut across several occupational fields. The NEC Structure supplements the Enlisted Rating Structure by

Rating Abbreviation	Rating Title
AB	AVIATION BOATSWAIN'S MATE
ABE	Aviation Boatswain's Mate (Launching & Recovery Equipment)
ABF	Aviation Boatswain's Mate (Fuels)
ABH	Aviation Boatswain's Mate (Aircraft Handling)
AC	AIR TRAFFIC CONTROLLER
AD	AVIATION MACHINIST'S MATE
ADR	Aviation Machinist's Mate (Reciprocating Mechanic)
AE	AVIATION ELECTRICIAN'S MATE
AF	AIRCRAFT MAINTENANCEMAN (E-9 only)
AG	AEROGRAPHER'S MATE
AK	AVIATION STOREKEEPER
AM	AVIATION STRUCTURAL MECHANIC
AME	Aviation Structural Mechanic (Safety Equipment)
AMH	Aviation Structural Mechanic (Hydraulics)
AMS	Aviation Structural Mechanic (Structures)
AO	AVIATION ORDNANCEMAN
AQ	AVIATION FIRE CONTROL TECHNICIAN
AS	AVIATION SUPPORT EQUIPMENT TECHNICIAN
ASE	Aviation Support Equipment Technician (Electrical)
ASH	Aviation Support Equipment Technician (Hydraulics & Structures)
ASM	Aviation Support Equipment Technician (Mechanical)
AT	AVIATION ELECTRONICS TECHNICIAN
AV	AVIONICS TECHNICIAN (E-9 only)
AW	AVIATION ANTISUBMARINE WARFARE OPERATOR
AX	AVIATION ANTISUBMARINE WARFARE TECHNICIAN
AZ	AVIATION MAINTENANCE ADMINISTRATION
BM	BOATSWAIN'S MATE
BT	BOILER TECHNICIAN
BU	BUILDER
CE	CONSTRUCTION ELECTRICIAN
CM	CONSTRUCTION MECHANIC
CT	CRYPTOLOGIC TECHNICIAN
CTA	Cryptologic Technician (Administration Branch)
CTI	Cryptologic Technician (Interpretive Branch)
CTM	Cryptologic Technician (Maintenance Branch)

Exhibit II-2. NAVY ENLISTED RATINGS

Rating Abbreviation	Rating Title
CTO	Cryptologic Technician (Communications Branch)
CTR	Cryptologic Technician (Collection Branch)
CTT	Cryptologic Technician (Technical Branch)
CU	CONSTRUCTIONMAN (E-9 only)
DK	DISBURSING CLERK
DM	ILLUSTRATOR DRAFTSMAN
DP	DATA PROCESSING TECHNICIAN
DS	DATA SYSTEMS TECHNICIAN
DT	DENTAL TECHNICIAN
EA	ENGINEERING AID
EM	ELECTRICIAN'S MATE
EN	ENGINEMAN
EO	EQUIPMENT OPERATOR
EQ	EQUIPMENTMAN (E-9 only)
ET	ELECTRONICS TECHNICIAN
EW	ELECTRONICS WARFARE TECHNICIAN
FT	FIRE CONTROL TECHNICIAN
FTB	Fire Control Technician (Ballistic Missile Fire Control)
FTG	Fire Control Technician (Gun Fire Control)
FTM	Fire Control Technician (Surface Missile Fire Control)
GM	GUNNER'S MATE
GMG	Gunner's Mate (Guns)
GMM	Gunner's Mate (Missiles)
GMT	Gunner's Mate (Technician)
GS	GAS TURBINE SYSTEMS TECHNICIAN
GSE	Gas Turbine Systems Technician (Electrical)
GSM	Gas Turbine Systems Technician (Mechanical)
HM	HOSPITAL CORPSMAN
HT	HULL MAINTENANCE TECHNICIAN
IC	INTERIOR COMMUNICATIONS ELECTRICIAN (includes EMCM)
IM	INSTRUMENTMAN (includes PICM)
IS	INTELLIGENCE SPECIALIST
JO	JOURNALIST
LI	LITHOGRAPHER
LN	LEGALMAN
MA	MASTER-AT-ARMS
ML	MOLDER
MM	MACHINIST'S MATE
MN	MINEMAN
MR	MACHINERY REPAIRMAN

Exhibit II-2. NAVY ENLISTED RATINGS (CONT'D)

Rating Abbreviation	Rating Title
MS	MESS MANAGEMENT SPECIALIST
MT	MISSILE TECHNICIAN
MU	MUSICIAN
NC	NAVY COUNSELOR
OM	OPTICALMAN (includes PICM)
OS	OPERATIONS SPECIALIST
OT	OCEAN SYSTEMS TECHNICIAN
PC	POSTAL CLERK
PH	PHOTOGRAPHER'S MATE
PI	PRECISION INSTRUMENTMAN (E-9 only)
PM	PATTERNMAKER (includes MLCM)
PN	PERSONNELMAN
PR	AIRCREW SURVIVAL EQUIPMENTMAN
QM	QUARTERMASTER
RM	RADIOMAN
RP	RELIGIOUS PROGRAM SPECIALIST
SH	SHIP'S SERVICEMAN
SK	STOREKEEPER
SM	SIGNALMAN
ST	SONAR TECHNICIAN
STG	Sonar Technician (Surface)
STS	Sonar Technician (Submarine)
SW	STEELWORKER (includes CUCM)
TD	TRADEVMAN
TM	TORPEDOMAN'S MATE
UT	UTILITIESMAN
YN	YEOMAN

Exhibit II-2. NAVY ENLISTED RATINGS (CONT'D)

identifying more specialized skills which are not required rating-wide. An individual already specialized by an NEC usually does not attend a course to earn an additional NEC unless the course is a logical progression of the earlier specialty training, the NEC held concerns outdated technology, or the individual is in an approved program for formal conversion to a new rating. Enlisted personnel on active duty may earn five NECs, ranked as primary, secondary, and lower positions.

C. PROCEDURES FOR ADVANCEMENT OF ENLISTED PERSONNEL

The procedure for advancement within the Navy is somewhat complex. To aid in the understanding of training pipelines, this report provides a brief explanation of portions of the advancement procedures.

Through an initial contract, a 6YO recruit is guaranteed specific opportunities for advancement. In general, upon successful completion of Class "A" School, a 6YO enlisted person in paygrade E-3 achieves a specific rating and is advanced to paygrade E-4. In some ratings, such as Electronics Technician (ET), a 6YO student who is unable to satisfactorily complete Class "A" School becomes a 4YO.

The 4YO enlisted personnel have several different advancement options. The term "striker" identifies personnel satisfying basic occupational qualifications equal to the minimum qualifications for paygrade E-4 within a specific rating. In order to be designated as a striker, enlisted personnel in the general

apprenticeships at paygrades E-2 and E-3 must satisfy one of the following criteria:

- successfully complete Class "A" School;
- demonstrate significant qualifications for a specific rating; or
- pass the examination for advancement to petty officer third class, but not be advanced due to insufficient quotas in that specific rating.

A designated striker is not automatically advanced to paygrade E-4. The many options for striker advancement include:

- recommendation by Class "A" School,
- evaluation of performance after four to six months with the fleet, and
- sufficient Final Multiple Score.

The Final Multiple Score is computed in the following manner:

Weight (%)	
35	Standard score on advancement exam
30	Performance mark average received on enlisted evaluation
13	Length of service
13	Time in rate
4.5	Awards, medals, etc.
4.5	PNA (Passed but Not Advanced) points
100.0	Final Multiple Score

The Final Multiple Score is a rank-order system. Therefore, in order to fill a quota, the highest ranked E-3 enlisted personnel trained in a specific rating are selected by Final Multiple Score and advanced to paygrade E-4.

D. STUDENT BACKLOG

One of the potential problems associated with training pipelines involves students waiting an excessive amount of time for training.

In general, for every student awaiting instruction (AI), a position is vacant in the operational force. AI personnel are usually in a non-productive status. There is, however, a minimum level of backlog (AI students) necessary to ensure that all school seats are utilized. This "unavoidable backlog" includes students in an administrative hold status (e.g., in-processing, medical, legal, security clearance, disciplinary, and emergency leave).

As discussed previously in Section II.A, many factors affect the student pipeline flow and, therefore, the student backlog. A concerted effort to evaluate and to eliminate the Navy enlisted excess backlog began in May 1981 when the Vice Chief of Naval Operations (VCNO) called for a study to examine the Specialized Training pipeline. This study addressed the efficiency of the pipeline, quantities of students and instructors, instructional time, and course lengths. The report states that "the backlog stems almost entirely from the lack of production capacity which results from an inadequate number of instructors."[2/] The actions recommended by the Study Group to alleviate the enlisted training backlog problem are listed in Appendix B of this report.

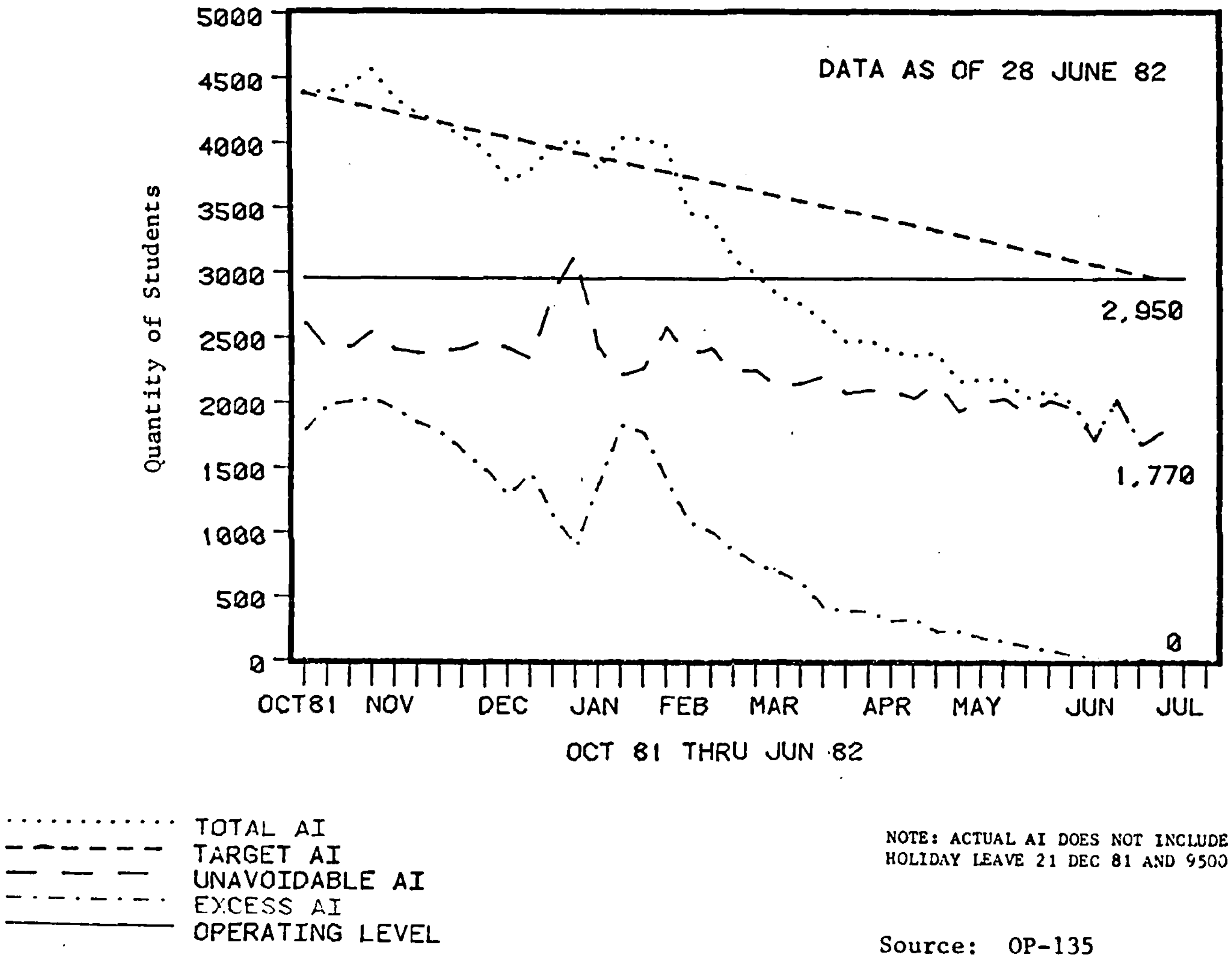
In April 1982, the General Accounting Office (GAO) prepared a draft report entitled Backlog of Enlisted Personnel Awaiting Initial Skill Training Results in Inefficiency and Unnecessary Cost--OSD Case No. 5947, which was reviewed by the Department

2/Report of the Study Group to Evaluate the Enlisted Training Backlog, RADM D.L. Freeman, et al., July 1981. Prepared for the Deputy Chief of Naval Operations (MPT).

of the Navy. In its comments on the draft report findings and recommendations, the Department of the Navy discussed a sample of the numerous management actions previously initiated by the Navy to eliminate pipeline inefficiencies (both excess and unavoidable). These actions include the following.

- Increased emphasis was placed on manning training-related billets.
- The Navy reprogrammed funds in order to increase the contracting-out of instructor billets for FY82 and FY83.
- Many internal schoolhouse actions were undertaken (e.g., curriculum adjustments, curtailed instructor leave, extra shifts).
- The practice of assigning non-school guarantee recruits to initial skill training schools to fill missed school seat "sales" ("RTC pickups") was curtailed in July 1981.
- Increased emphasis was placed on reducing the quantity of personnel in the unavoidable AI category (e.g., reduction in processing time, optimal sequencing of follow-on training).
- Attention has been directed toward reduction in total training pipeline time (e.g., since March 1982 enlisted recruits have been assigned to recruit training centers which are co-located with follow-on Initial Skill Training schools).
- The Center for Naval Analyses (CNA) is currently developing a computer management model to aid in training pipeline execution.

Since January 1982, the quantity of AI personnel has been significantly reduced. As of 28 June 1982, the total number of AI enlisted personnel at the Navy's twenty major training activities was 1,770 (1,770 - unavoidable backlog; 0 - excess backlog). Exhibit II-3 displays the Navy's total, unavoidable, and excess backlog (AI) levels during FY82.



NOTE: ACTUAL AI DOES NOT INCLUDE 3900 STUDENTS ON HOLIDAY LEAVE 21 DEC 81 AND 9500 ON 28 DEC 81.

Source: OP-135

Exhibit II-3. AWAITING INSTRUCTION - FY82

III. AVIATION ELECTRONICS TECHNICIAN (AT)

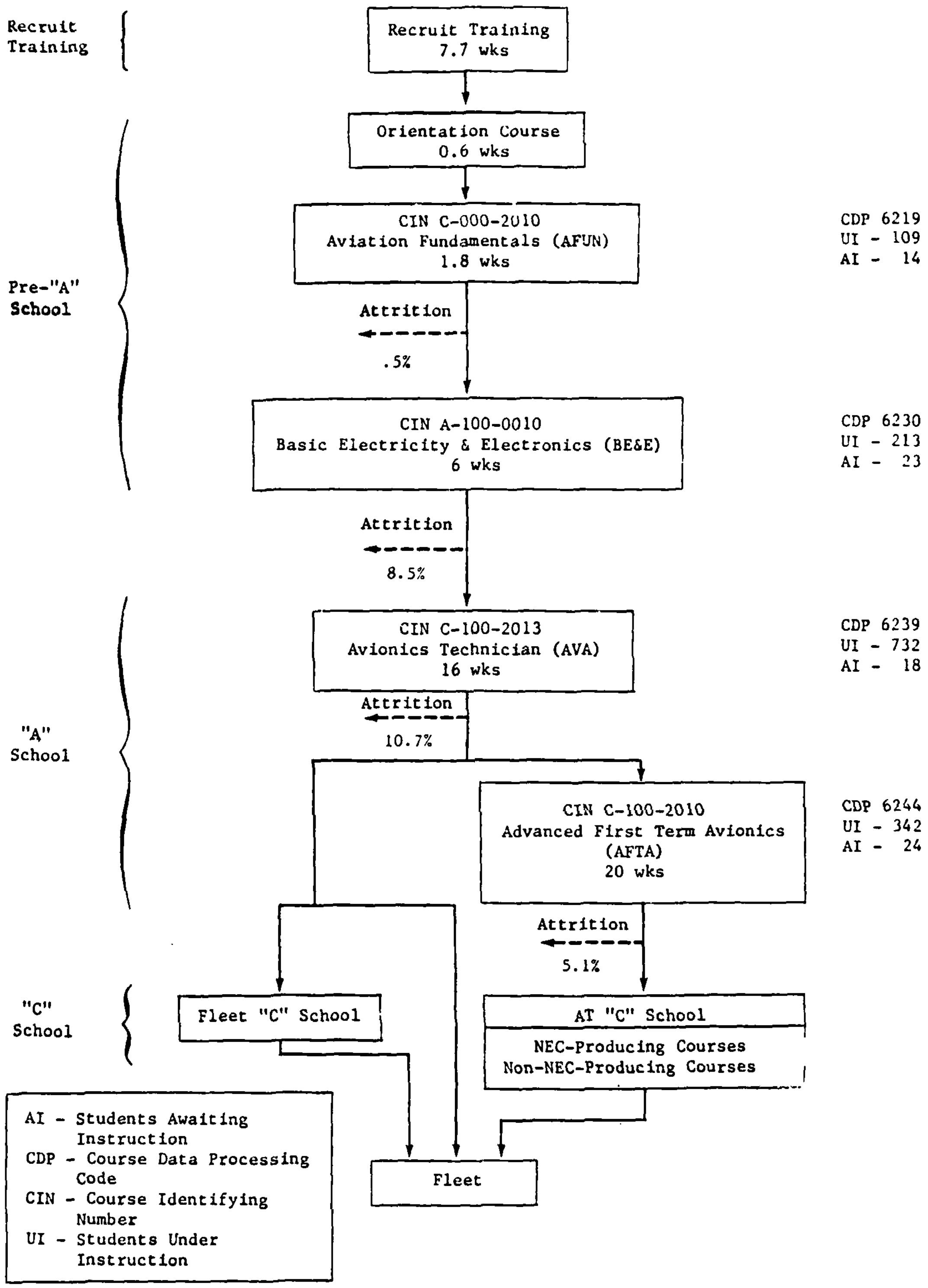
This section discusses the following:

- General Flow of Courses,
- Initial Skill Training,
- Advanced Initial Skill Training, and
- Pipeline Attrition.

A. GENERAL FLOW OF COURSES

The Aviation Electronics Technician (AT) inspects and performs organizational and intermediate maintenance on aviation electronics equipment. Exhibit III-1 displays the typical training paths for the AT rating and includes the following information:

- course identifying number (CIN) - identifies the command sponsoring the course, the DoD skill for which the course trains, and the sequence number of the course of instruction (which may be conducted at multiple locations);
- course title;
- length of course in weeks (wks);
- actual average attrition rate for FY82;
- course data processing (CDP) code - uniquely identifies a course at a particular training activity;
- monthly quantity of students Under Instruction (UI) - computed as the actual number of man-days represented by students UI during the month (May 1982) divided by the number of days in the month; and
- monthly quantity of students Awaiting Instruction (AI) - computed as the actual number of man-days represented by students AI (unavoidable and excess) during the month (May 1982) divided by the number of days in the month.



Sources: Interviews; CNET Report 1500.1208 NITRAS Course Summary by Type Course, as of 82/05/31; Catalog of Navy Training Courses, July 1982.

Exhibit III-1. NAVY AVIATION ELECTRONICS TECHNICIAN (AT) RATING TRAINING PIPELINE

All courses listed in Exhibit III-1, except Recruit Training and Class "C" School courses, are located at the Naval Aviation Technical Training Center (NATTC) in Memphis, Tennessee. Upon arrival at NATTC, all recruit graduates attend a three-day orientation course. Three of the Initial Skill Training courses are self-paced:

- two Class "A" School Preparatory courses:
  - Aviation Fundamentals (AFUN), and
  - Basic Electricity and Electronics (BE&E); and
- one Class "A" School course:
  - Avionics Technician (AVA).

Hence, the course lengths shown in Exhibit III-1 are average figures, not actual. The AI figures indicate no serious backlogs exist at this time; the low values appear to imply unavoidable AI and minimal excess AI backlog. Only AT student data is displayed by CDP in Exhibit III-1.

B. INITIAL SKILL TRAINING

The AFUN course uses computer instruction methods and covers mainly squadron organization, publications, and use of tools. The total planned input for FY82 was about 17,000 students in all eligible ratings, including 2,157 AT students. Currently, only two shifts of this course are taught per day. If the rate of graduating students were significantly increased (which is possible), a severe AI backlog might be created in Class "A" School courses further down the AT pipeline.

The BE&E course consists of 14 modules, which cover the following topics:[3/]

- DC series and parallel circuits,
- AC test equipment,
- AC simple circuits, and
- AC parallel resonance circuits.

The total planned input for FY82 was about 7,800 students in all eligible ratings, including 2,157 AT students. Typically, the BE&E classes are not filled to maximum capacity.

The AVA course consists of six segments, covering the following topics:

- AM transceivers, including general maintenance and semi-conductors (200 hours);[4/]
- FM (12 hours);
- digital computers, including binary and boolean algebra (70 hours);
- radar (160 hours);
- TACAN IFF (6 hours); and
- soldering and recap (30 hours).

The total planned input for FY82 was about 4,600 students in all eligible ratings,[5/] including 1,840 AT students. As previously noted, if the rate of graduating AFUN (or BE&E) students were significantly increased, a severe AI backlog would be created

3/These topics, plus many more, are covered in the BE&E course in the Electronics Technician (ET) training pipeline.
4/Course length is based on six hours per day, five days per week.
5/i.e., AT; Aviation Antisubmarine Warfare Technician (AX); and Aviation Fire Control Technician (AQ).

in the AVA courses. Currently, three shifts of the AVA course are taught per day (0600-2400).

C. ADVANCED INITIAL SKILL TRAINING

At this point in the AT training pipeline, the 4YO personnel separate from the 6YO personnel. The 4YO graduates of the AVA course are designated as strikers in the AT, AX, or AQ ratings. They have spent 32 weeks in training (not including time spent waiting, on holiday, leave, etc.). The 4YO ATs either go directly to the fleet or they receive some form of advanced initial skill training (which is not NEC-producing). Nearly all AT personnel (both 4YO and 6YO) receive highly specialized aviation training at installation schools called Naval Air Maintenance Training Detachments (NAMTDs) followed by on-the-job training (OJT) in their squadrons.

Upon completion of the AVA course, the 6YO students receive their AT ratings and attend the Advanced First Term Avionics (AFTA) Class "A" School course. This course is group-paced and provides the advanced technical knowledge and skills usually associated with intermediate level maintenance. The topics addressed in this course basically parallel those addressed in the AVA course, but are covered in more depth by the AFTA course. The total planned input for FY82 was about 900 students in all eligible ratings, including 482 AT students.

After one full year of training (not including time spent waiting, on holiday, leave, etc.), the 6YO personnel have completed

their Class "A" School Initial Skill Training. Next, 6YO AT personnel attend appropriate Class "C" Schools to receive Advanced Initial Skill Training. This training results, in some cases, in award of an NEC. There are approximately 130 NECs which can be assigned to ATs. Each Class "C" School course is at least 13 days in length.

Finally, after completing all of their formal school training, the 6YO AT personnel are sent to the fleet. These personnel usually receive highly equipment-specific training at the installation schools (NAMTDs) and OJT in their squadrons.

D. PIPELINE ATTRITION

Exhibit III-1 includes actual pipeline attrition percentages for specific courses for FY82. These figures, however, do not provide an accurate representation of total pipeline attrition, because these numbers are a static view of a dynamic pipeline. Therefore, the numbers cannot simply be accumulated to provide a total attrition figure.

In order to gain an insight into the total pipeline attrition percentage for this pipeline, an "estimated FY82 cohort attrition" computation was accomplished. The resulting percentage from this computation gives a rough estimation of the total attrition over the entire pipeline. Procedures used in this calculation are as follows.

- "C" school attrition is not included because of the number of C schools involved in this pipeline. Recruit training is not included because it is not pipeline specific.

- Cohort attrition computations assume 100 students as the initial cohort entry. FY82 attrition percentages for each course in the pipeline are then applied in turn.

Actual calculations are provided below:

Course	Students Entering	1-Attrition	Students Completing
AFUN	100	.995	99.5
BE&E	99.5	.915	91.0
AVA	91.0	.893	81.3
AFTA	18.7[6/]	.949	17.7

Students in pipeline after AFTA: 81.3 - (18.7-17.7) = 80.3

Estimated pipeline attrition: 100 - 80.3 = 19.7%

6/Students entering AFTA computed as follows:

81.3 (students completing AVA) times $\frac{529}{2303}$ (fraction of personnel entering AFTA from AVA) = 18.7.

IV. ELECTRONICS TECHNICIAN (ET)

This section discusses the following:

- Overview of the ET Training Pipeline,
- Alignment of Initial Training Locations,
- Strategic Weapons Systems (SWS) Submariner ET,
- Common Basic Electricity and Electronics (BE&E) Course,
- Overlapping Class "A" Schools,
- Nuclear Field (NF) ET,
- Conventional Surface ET,
- Navigation Submariner ET,
- Electronic Warfare (EW) Submariner ET, and
- Pipeline Attrition.

A. OVERVIEW OF THE ET TRAINING PIPELINE

The Electronics Technician (ET) performs maintenance on nearly all electronic equipment[7/] used for communication, detection, tracking, recognition and identification, and aids to navigation. The ET rating is one of about eight ratings which fall under the Advanced Electronics Field (AEF). The five major categories of the ET rating and the average lengths of typical training paths leading to first fleet assignment are as follows:

- Strategic Weapons Systems (SWS) Submariner AEF ET - 15 months (including 31 weeks of Class "C" School),

7/Exceptions: airborne equipment, data processing systems, interior communications systems, teletypewriters, sonar, dead reckoning analyzer indicators, weapons control systems, and electronic warfare systems.

- Nuclear Field (NF) ET - 22 months,
- Conventional Surface AEF ET - 12 months (including one month of Class "C" School),
- Navigation (NAV) Submariner AEF ET - 11 months (including one month of Class "C" School), and
- Electronic Warfare (EW) Submariner AEF ET - 12 months (including one month in Class "C" School).

The Nuclear Field ET does not fall under the AEF category.

Exhibits IV-1 through IV-6 display the typical training paths for the ET rating. Exhibit IV-1 summarizes the overall ET training pipeline; Exhibits IV-2 through IV-6 focus on the five separate training paths and include the following information (as defined in Section III.A):

- course identifying number (CIN),
- course title,
- length of course,
- actual attrition rate for FY82,
- course data processing (CDP) code,
- monthly quantity of students Under Instruction (UI), and
- monthly quantity of students Awaiting Instruction (AI).

With one exception, the May 1982 AI data[8/] on the five ET types does not reveal significant excess student backlogs. In the NF ET pipeline (shown in Exhibit IV-3), a large quantity of

8/Source: CNET Report 1500.1208, NITRAS Course Summary by Type Course, as of 82/05/31.

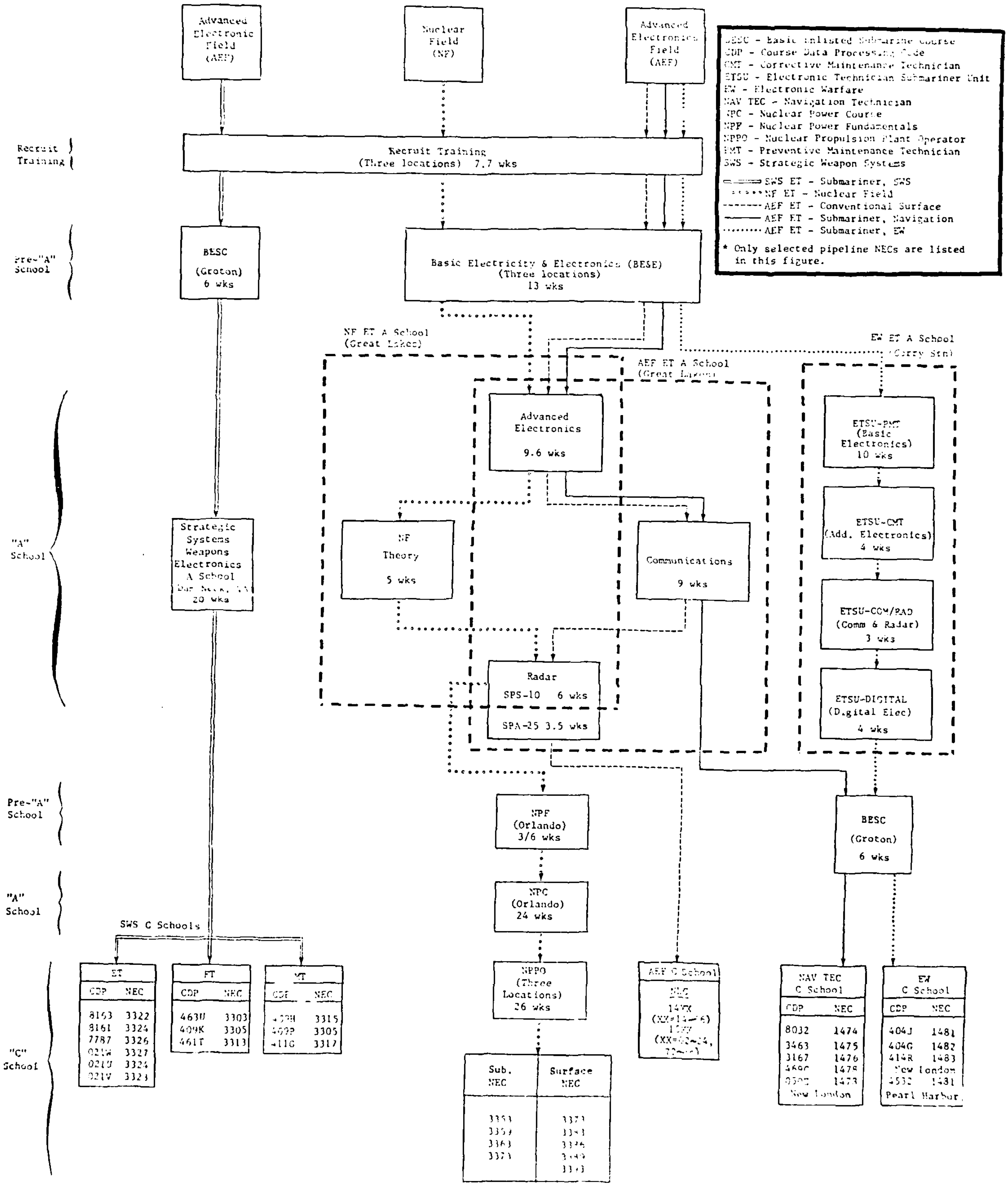
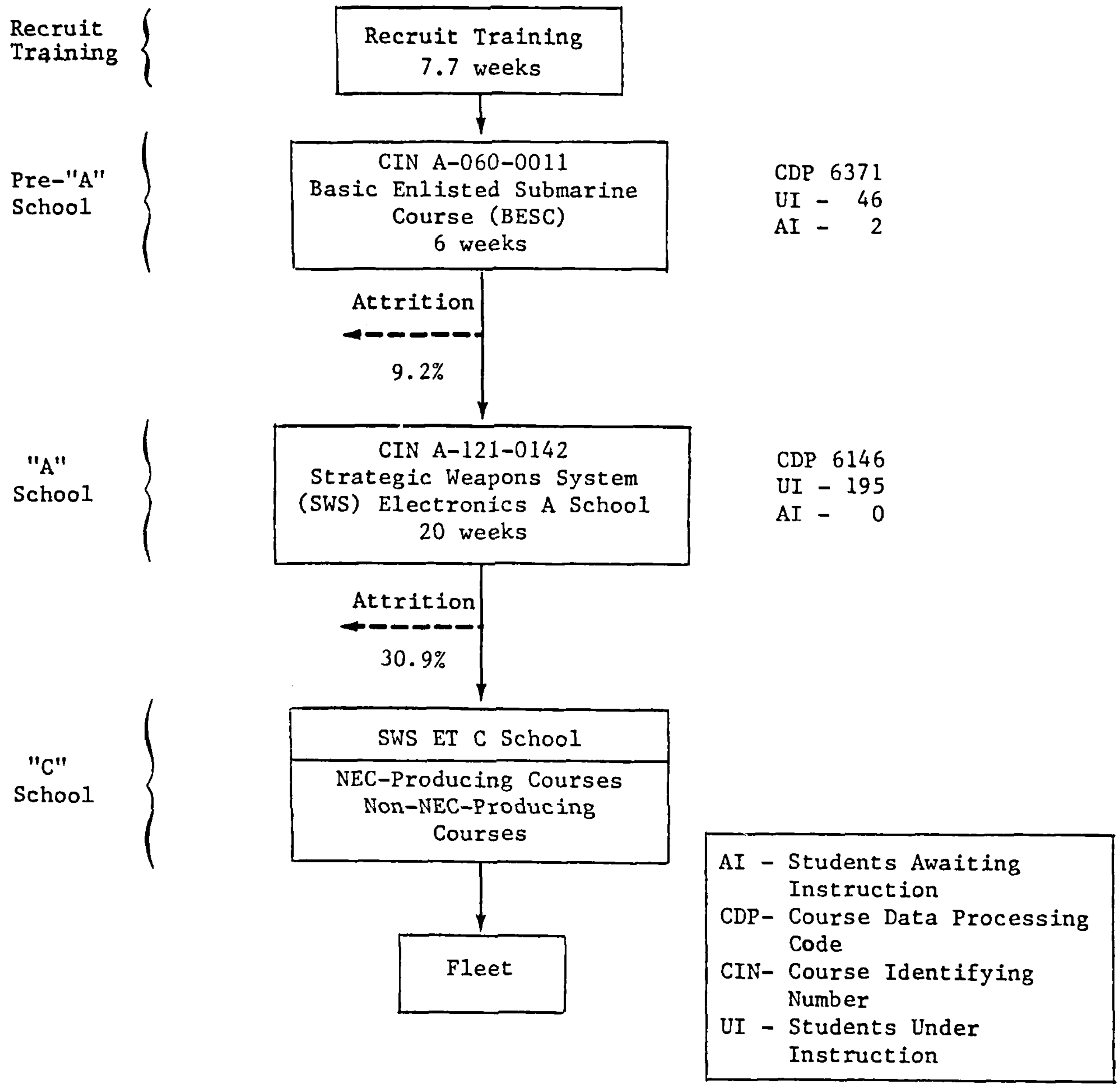


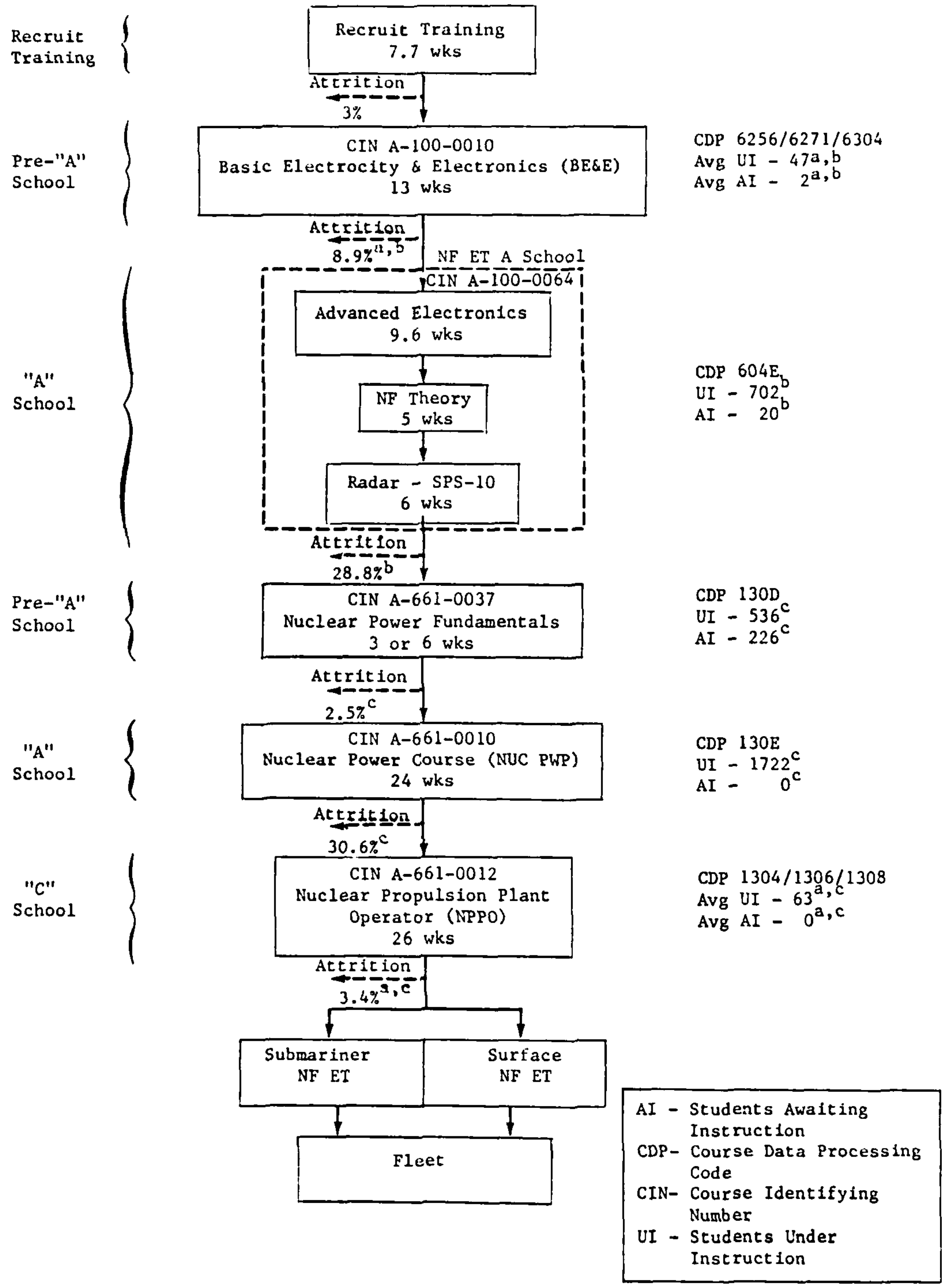
Exhibit IV-1. NAVY ELECTRONICS TECHNICIAN (ET) RATING TRAINING PIPELINE - SUMMARY



Note: Attrition rates and student quantities include all eligible SWS ratings (ET, FTB and MT).

Sources: Interviews; CNET Report 1500.1208, NITRAS Course Summary by Type Course, as of 82/05/31; Catalog of Navy Training Courses, July 1982.

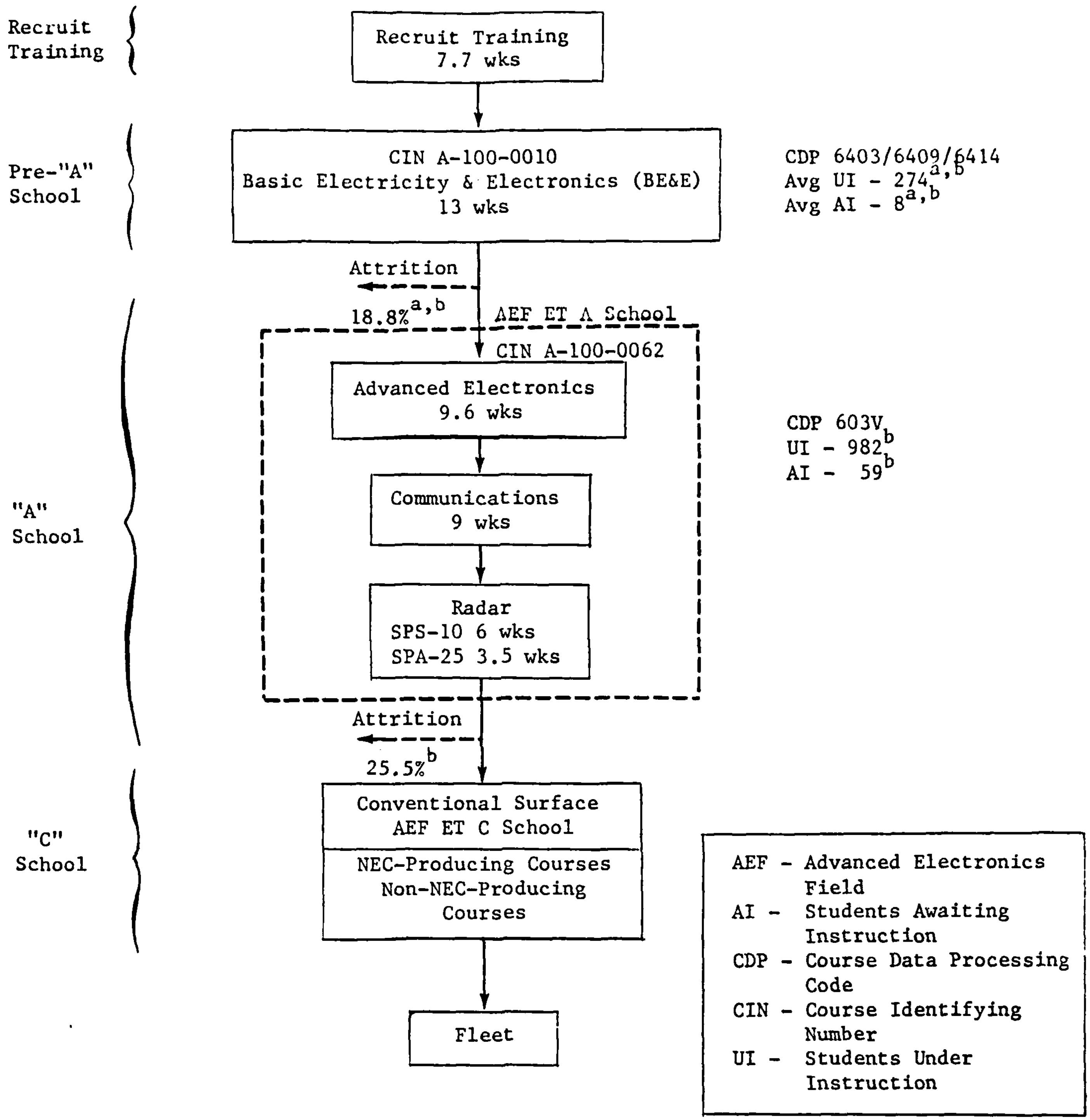
Exhibit IV-2. TRAINING PIPELINE FOR ELECTRONICS TECHNICIAN (ET) - ADVANCED ELECTRONICS FIELD (AEF), STRATEGIC WEAPONS SYSTEMS (SWS) SUBMARINER



[a] Average for three training sites.
[b] Includes NF ET students only.
[c] Includes NF EM, ET and MM students.

Sources: Interviews; CNET Report 1500.1208, NITRAS Course Summary by Type Course, as of 82/05/31; Catalog of Navy Training Courses, July 1982.

Exhibit IV-3. TRAINING PIPELINE FOR ELECTRONICS TECHNICIAN (ET) - NUCLEAR FIELD (NF)

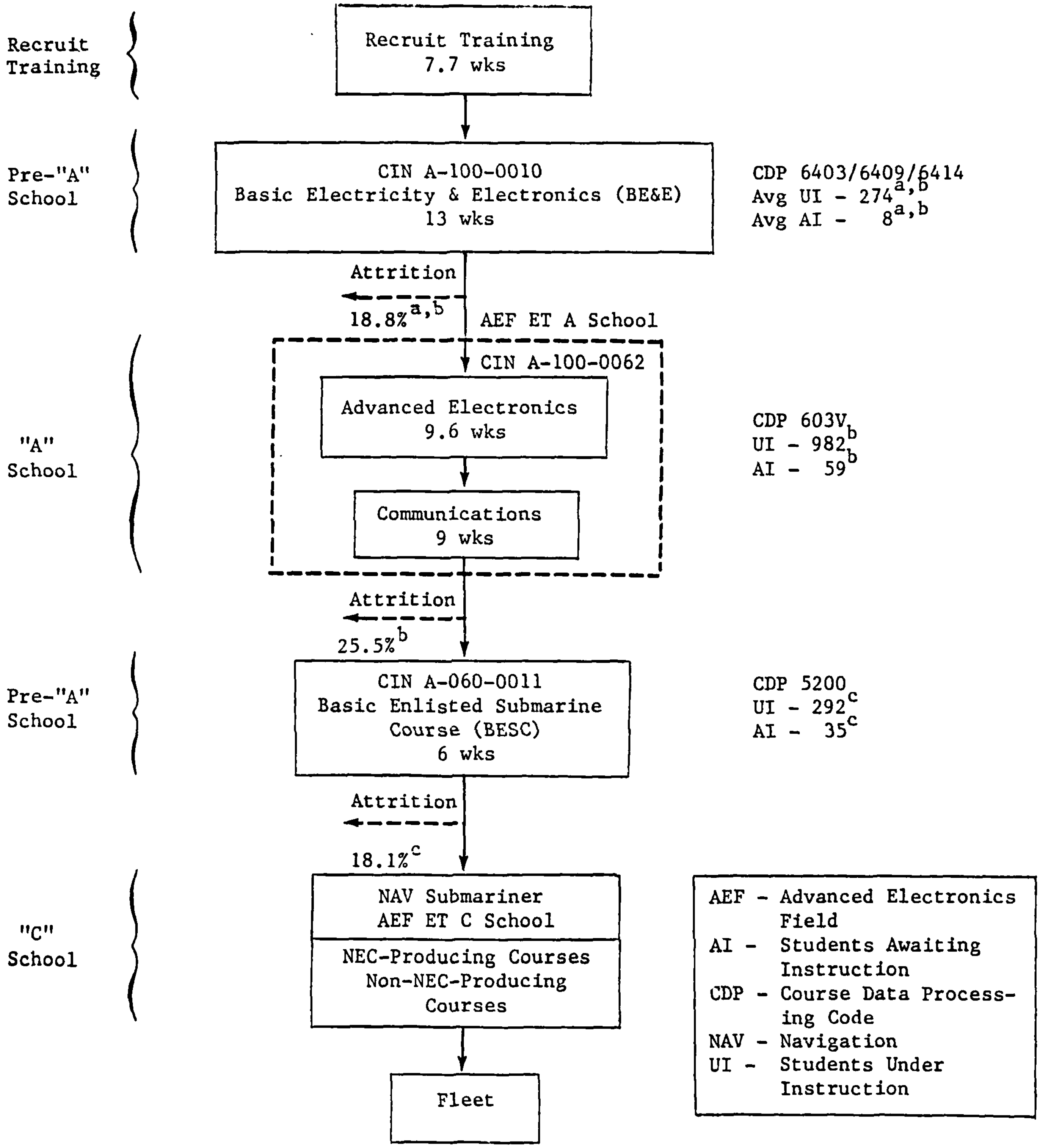


[a]Average for three training sites.

[b]Includes all eligible AEF ET students.

Sources: Interviews; CNET Report 1500.1208, NITRAS Course Summary by Type Course, as of 82/05/31; Catalog of Navy Training Courses, July 1982.

Exhibit IV-4. TRAINING PIPELINE FOR ELECTRONICS TECHNICIAN (ET) - ADVANCED ELECTRONICS FIELD (AEF), CONVENTIONAL SURFACE



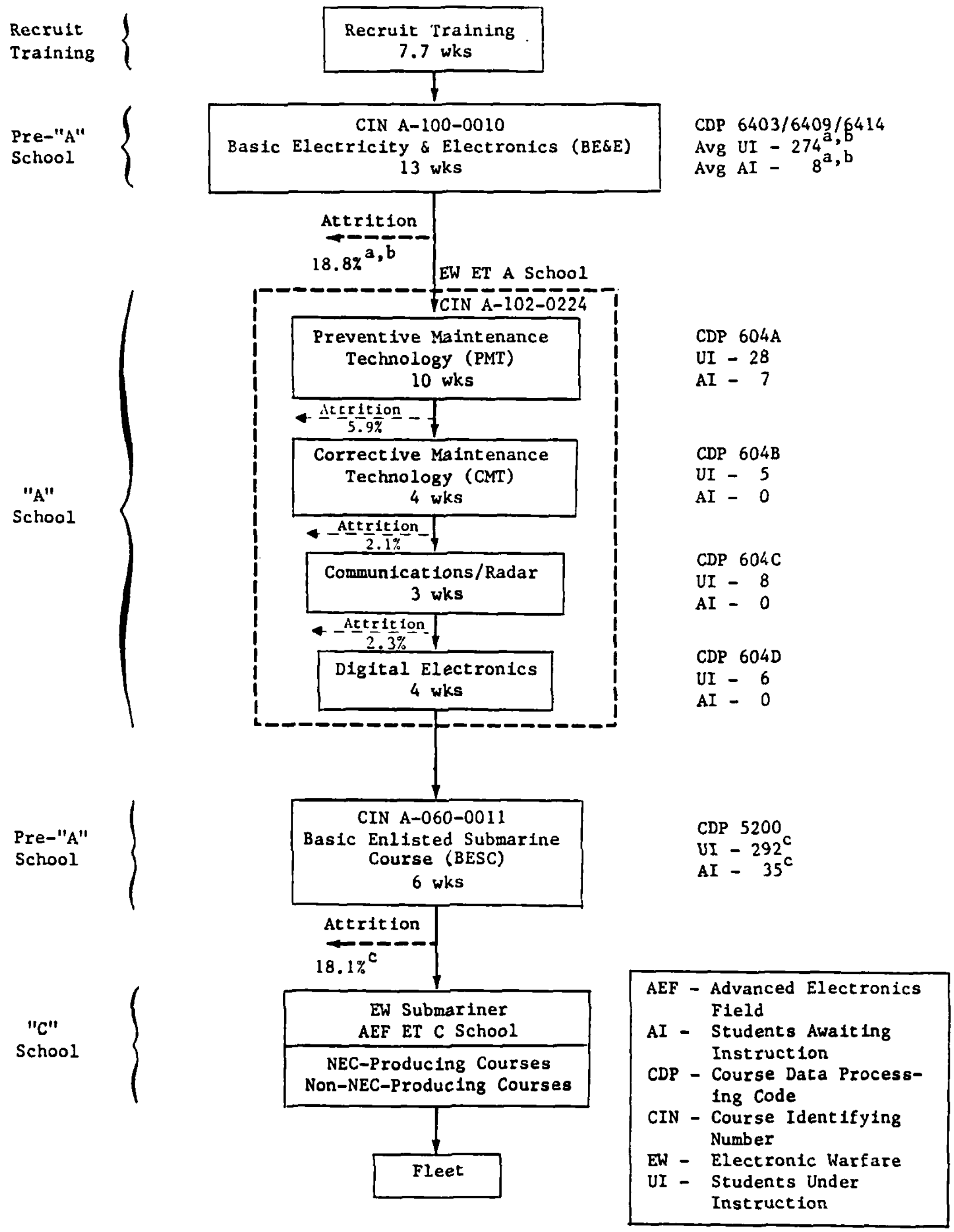
[a] Average for three training sites.

[b] Includes all eligible AEF ET students.

[c] Includes NAV/EW ET students.

Sources: Interviews; CNET Report 1500.1208, NITRAS Course Summary by Type Course, as of 82/05/31; Catalog of Navy Training Courses, July 1982.

Exhibit IV-5. TRAINING PIPELINE FOR ELECTRONICS TECHNICIAN (ET) - ADVANCED ELECTRONICS FIELD (AEF), NAVIGATION SUBMARINER



[a]Average for three training sites.

[b]Includes all eligible AEF ET students.

[c]Includes NAV/EW ET students.

Sources: Interviews; CNET Report 1500.1208, NITRAS Course Summary by Type Course, as of 82/05/31; Catalog of Navy Training Courses, July 1982.

Exhibit IV-6. TRAINING PIPELINE FOR ELECTRONICS TECHNICIAN (ET) - ADVANCED ELECTRONICS FIELD (AEF), ELECTRONIC WARFARE (EW) SUBMARINER

NF students wait for entry into the Nuclear Power Fundamentals (NPF) course. Graduates of the NPF course, however, need not wait for entry into the subsequent Nuclear Power Course.

B. ALIGNMENT OF INITIAL TRAINING LOCATIONS

Recruit Training is conducted at three Recruit Training Centers (RTCs) located at Great Lakes, Illinois; San Diego, California; and Orlando, Florida. Initial Skill Training for ET students is conducted at the following locations:

- Great Lakes, Illinois
  - Basic Electricity & Electronics (BE&E) Course
  - NF ET Class "A" School
  - AEF ET Class "A" School
- San Diego, California
  - BE&E Course
- Orlando, Florida
  - BE&E Course
  - Nuclear Power Fundamentals (NPF) Course
  - Nuclear Power Course (NPC)
- Pensacola (Corry Station), Florida
  - EW ET Class "A" School
- New London, Connecticut
  - Basic Enlisted Submarine Course (BESC)
- Dam Neck, Virginia
  - SWS ET Class "A" School

To reduce processing time and student backlogs, the Navy attempts to align RTC and Initial Skill Training location when quotas permit. Nearly all personnel in the NF ET, Conventional Surface AEF ET, and Navigation Submariner AEF ET pipelines are sent to Great

Lakes for Recruit Training, the BE&E course, and Class "A" School. Most EW ET students are sent to Orlando for Recruit Training and the BE&E course, and then to Pensacola for EW Submariner ET Class "A" School. If quotas permit, SWS Submariner ET students receive their Recruit Training at Orlando.

C. STRATEGIC WEAPONS SYSTEMS (SWS) SUBMARINER ET

Exhibit IV-2 displays the typical training pipeline for SWS Submariner AEF ET students. The low AI figures indicate no serious backlogs exist at this time. The Basic Enlisted Submarine Course (BESC), CIN A-060-0011, is attended by enlisted personnel selected for submarine duty and in training for one of several ratings. If a student fails BESC, he cannot fill any position on a submarine; instead, he receives training as a surface ET or in some other rating. The BESC provides instruction in the basic theory, construction and operation of nuclear-powered submarines. The total planned FY82 input for the BESC was 700 SWS students. The SWS Electronics Class "A" School provides basic knowledge of electricity (six weeks); solid state electronics and inertial guidance theory (seven weeks); and computer fundamentals and digital logic principles (four weeks). The total planned FY82 input for this course was 644 SWS students of all eligible ratings. Final selection for ET, Fire Control Technician-Ballistic Missile Fire Control (FTB) or Missile Technician (MT) is determined by the Commanding Officer, Naval Guided Missile School (Dam Neck), prior to graduation from the Class "A" School. After completion of SWS

Electronics Class "A" School and about eight months of training,[9] the SWS ET students attend appropriate Class "C" School courses. This training results, in some cases, in the award of an NEC. Each AEF ET attends at least four weeks of Advanced Initial Skill Training before initial fleet assignment. The average length of the SWS ET Class "C" School courses listed in Exhibit IV-1 is 31 weeks. In general, there is no student AI backlog in Class "C" School.

D. COMMON BASIC ELECTRICITY AND ELECTRONICS (BE&E) COURSE

The four remaining types of ET students begin with the same Class "A" Preparatory course, as shown in Exhibit IV-1. The BE&E course (CIN A-100-0010) provides a common core introduction to basic electrical and electronic principles. It is the first formal course for sixteen Navy Class "A" Schools. The course is attended by students from 21 Navy electrical/electronics ratings plus foreign nationals, civilians, and personnel from the U.S. Air Force and U.S. Marine Corps. There is a separate CDP code for each participating rating at each training site. For example, CDP 6256 refers to the BE&E course in Great Lakes for NF ET students, and CDP 6403 refers to the BE&E course in Orlando for AEF ET students. The low AI averages (two NF ET students and eight AEF ET students) indicate no serious backlogs exist at this time. The BE&E course consists of 34 self-

9/Not including time spent waiting, on holiday, leave, etc.

paced, computer-managed modules. Only the ET students attend each of the thirty-four modules; other students attend only selected modules. Based on accession authorization, attrition rates, etc., the quantity of personnel required to enter BE&E school in order to meet the long-term Navy goal of 600 manned ships in 1990 is as follows:

	FY82	FY83
AEF ET	2,629[10/]	2,831
NF ET	1,106	1,270
Reserves	75	75
Ready Mariners (Inactive Reserves)	0	5
U.S.M.C.	33	35
U.S.A.F.	234	250
Foreign Nationals	23	23
Total "Front Door Load"	4,100	4,489

(Source: OP-13 Input Plan)

E. OVERLAPPING CLASS "A" SCHOOLS

Several courses in the NF ET and AEF ET Class "A" Schools overlap, as shown in Exhibit IV-1. During a 21-week period, the NF ET Class "A" School (CDP 604E) provides basic knowledge of advanced electronics, circuit analysis, digital fundamentals, NF theory, and corrective and preventative maintenance techniques for generic radar equipment using AN/SPS-10. The AEF ET Class "A" School (CDP 603V) shares the advanced electronics and AN/SPS-10 portions of the CDP 604E, but not the five-week NF theory portion. Instead, CDP 603V includes nine weeks of training with communications equipment and 3.5 weeks with AN/SPA-25. Conventional Surface AEF ET students attend the entire 28-week CDP 603V.

10/ Surface - 2,479 and submarine - 150.

Navigation Submariner AEF ET students attend only 19 weeks of CDP 603V; they do not receive specific training on radar. The total planned FY82 input for CDP 604E was 1,051 NF ET students. The total planned FY82 input for CDP 603V was 2,276 Conventional Surface AEF ET and Navigation Submariner AEF ET students. The May 1982 AI figures for these NF and AEF Class "A" Schools are relatively small, three percent and six percent of the UI values, respectively. The low values appear to imply unavoidable AI and minimal excess backlog due, in part, to the course being taught 24 hours per day.

F. NUCLEAR FIELD (NF) ET

The "lower one-third rule" is followed in the NF. Those students ranked in the bottom third of Class "A" School graduates will not receive NF ET ratings; instead, they receive AEF ET ratings. For personnel redesignated as AEF ET or who have become career-designated through reenlistment, CDP 604L provides access to electronics training at the Class "A" School level or lower. During May 1982, seven students[11/] fell into the CDP 604L category. These ex-NF ET students attend the communications and the AN/SPA-25 portions of AEF ET Class "A" School that they missed while in the NF pipeline, and they become Conventional Surface AEF ETs.

After successful completion of NF ET Class "A" School (CDP 604E) and about 41 weeks of training,[12/] NF ET students receive

11/Source: CNET Report 1500.1208 NITRAS Course Summary by Type Course, as of 82/05/31.
12/Not including time spent waiting, on holiday, leave, etc.

their ratings and begin specific NF training (as shown in Exhibit IV-3). The courses CIN A-661-0037, -0010, and -0012 are attended by NF personnel in the following ratings: Electrician's Mate (EM), Machinist's Mate (MM), and ET. The Nuclear Power Fundamentals (NPF) Course provides a basic review of physics and mathematics. NF students attend the NPF course for six weeks, if they scored under sixty percent on the NF Qualifications Test, or for three weeks if they scored sixty percent or higher on the test. The AI figure for NPF is high--42 percent of the UI value. Among the possible factors causing this student backlog is scheduling. The NPS course convenes every six weeks. Every week, however, students graduate from NF ET, EM, and MM Class "A" Schools. The NPF course backlog situation apparently "heals" itself. The Nuclear Power Course (NPC), which follows in the training pipeline, has no students AI. The NPC covers subjects related to nuclear propulsion; nuclear physics and reactor engineering; and naval nuclear propulsion plant construction instrumentation, operation and mechanical and electrical systems. The total planned FY82 input for each of these Initial Skill Training courses was 3,605 NF personnel in the ET, EM, and MM ratings. Next, NF students report to the Nuclear Propulsion Plant Operator (NPPO) course at Idaho Falls, Idaho; Balston Spa, New York; or Windsor, Connecticut. The NPPO course provides training in the operation and maintenance of Reactor Control Systems for Nuclear Submarine and Surface Propulsion plants. The average total planned FY82 input for this course was about 206 NF students.

Finally, after nearly two years of training, NF ET personnel receive submariner- or surface-related NECs and go to the fleet for initial assignment.

G. CONVENTIONAL SURFACE ET

Exhibit IV-4 displays the typical training pipeline for Conventional Surface AEF ET students. After successful completion of AEF ET Class "A" School and nearly a full year of training,[13/] the conventional surface AEF ET students receive their ET ratings and attend appropriate Class "C" Schools. Each AEF ET attends at least four weeks of Advanced Initial Skill Training before initial fleet assignment. This training results, in some cases, in the award of an NEC.

H. NAVIGATION SUBMARINER ET

Exhibit IV-5 displays the typical training pipeline for Navigation Submariner AEF ET students. After successful completion of the required portions of AEF ET Class "A" School and about nine months of training, the Navigation Submariners AEF ET students receive their ET ratings and begin basic submarine training. The Navigation Submariner ET personnel attend the same Basic Enlisted Submarine Course (CIN A-060-0011) as the SWS Submariner ET personnel and the EW Submariner ET personnel. The total planned FY82 input for the CDP 5200 version of this course was 4,277 students,[14/] including Navigation and EW Submariner

13/Not including time spent waiting, on holiday, leave, etc.
14/All submariner ratings, except SWS.

ET students. Finally, after about 10-1/2 months of training, Navigation Submariner AEF ET students attend appropriate Class "C" Schools before initial fleet assignment. This training results, in some cases, in the award of an NEC.

I. ELECTRONIC WARFARE (EW) SUBMARINER ET

Exhibit IV-6 displays the typical training pipeline for EW Submariner AEF ET students. After BE&E school, the EW ET students attend the Submarine ET EW Technology Class "A" School. The first three phases of this Class "A" School (CDPs 604A, 604B and 604C) provide the knowledge and skills of basic electronics maintenance at a level required for later entry into the appropriate Class "C" School courses. CDP 604D prepares students for entering EW equipment courses which require digital and basic computer fundamentals. The average total planned FY82 input for each of these four phases was about 95 students. After completion of EW ET Class "A" School, the EW Submariner ET students receive their ratings and join the Navigation Submariner ET students in the Basic Enlisted Submarine Course (CDP 5200). Finally, after about eleven months of training, EW Submariner ET students attend appropriate Class "C" Schools before initial fleet assignment. This training results, in some cases, in the award of an NEC.

J. PIPELINE ATTRITION

As in the case of the AT pipeline shown at Exhibit III-1, the five ET pipelines shown at Exhibits IV-2 through IV-6 include actual pipeline attrition percentages for specific courses for

FY82. These numbers are also inappropriate for a simple accumulation to determine total pipeline attrition percentages, for the same reasons explained for the AT pipeline. Therefore, an "estimated FY82 cohort attrition" computation was accomplished for the five ET pipelines. The procedures for computing these percentages are the same as those used for the AT calculations.

Actual calculations are provided below:

- ET/AEF/SWS/Submariner Pipeline

Course	Students Entering	1-Attrition	Students Completing
BESC	100	.908	90.8
Pre-"A" School 15/	90.8	.950	86.3
"A" School	86.3	.691	59.6

Estimated pipeline attrition: 100 - 59.6 = 40.4%

- ET/NF Pipeline

Course	Students Entering	1-Attrition	Students Completing
BE&E	100	.911	91.1
NF ET "A" School	91.1	.712	64.9
NPF	64.9	.975	63.3
NPC "A" School	63.3	.694	43.9
NPPO	43.9	.966	42.4

Estimated pipeline attrition: 100 - 42.4 = 57.6%

- ET/AEF/Conventional Surface Pipeline

Course	Students Entering	1-Attrition	Students Completing
BE&E	100	.812	81.2
AEF ET "A" School	81.2	.745	60.5

Estimated pipeline attrition: 100 - 60.5 = 39.5%

15/Attrition for this course is 5%; it is separate from BESC but included in the same block on Exhibit IV-2.

- <u>ET/AEF/NAV/Submariner Pipeline</u>

Course	Students Entering	1-Attrition	Students Completing
BE&E	100	.812	81.2
AEF ET "A" School	81.2	.745	60.5
BESC	60.5	.819	49.5

Estimated pipeline attrition: 100 - 49.5 = <u>50.5%</u>

- <u>ET/AEF/EN/Submariner Pipeline</u>

Course	Students Entering	1-Attrition	Students Completing
BE&E	100	.812	81.2
PMT	81.2	.941	76.4
CMT	76.4	.979	74.8
CR	74.8	.977	73.1
DE	73.1	1.000	73.1
BESC	73.1	.819	59.9

Estimated pipeline attrition: 100 - 59.9 = <u>40.1%</u>

V. EVALUATION OF ACTUAL PERSONNEL DATA

In an attempt to better understand the flow of personnel through the ET pipeline, MCR examined the flow of the October-November 1980 cohort through the ET pipeline. The data used was received from NMPC and formulated as a special data request. The following information was provided for each individual:

- name,
- date of entry in the service,
- date of receiving the ET3 rating,
- date and location of present assignment, and
- CDPs of the four courses attended most recently.

Sixty-nine individuals with an active-duty service date of October or November 1980 appear to be following the projected training pipelines depicted in Exhibit IV-1. As shown in Exhibit V-1, the average time spent between entry to service and award of the ET3 rating differs between the historical cohort and the projected pipeline flow. These time differences are due, in part, to the following.

- A student could take more or less time than projected in Exhibit IV-1 to complete self-paced courses such as BE&E.
- The projected times do not include time spent awaiting entry to courses (e.g., in-processing, weekends, holidays, and leave).
- Courses modifications (e.g., course length and scheduled frequency) could have occurred since October and November 1980 enlistees entered the ET training pipeline.

The location of the BE&E course attended appears to impact on the actual time spent to achieve the ET3 rating. In addition to

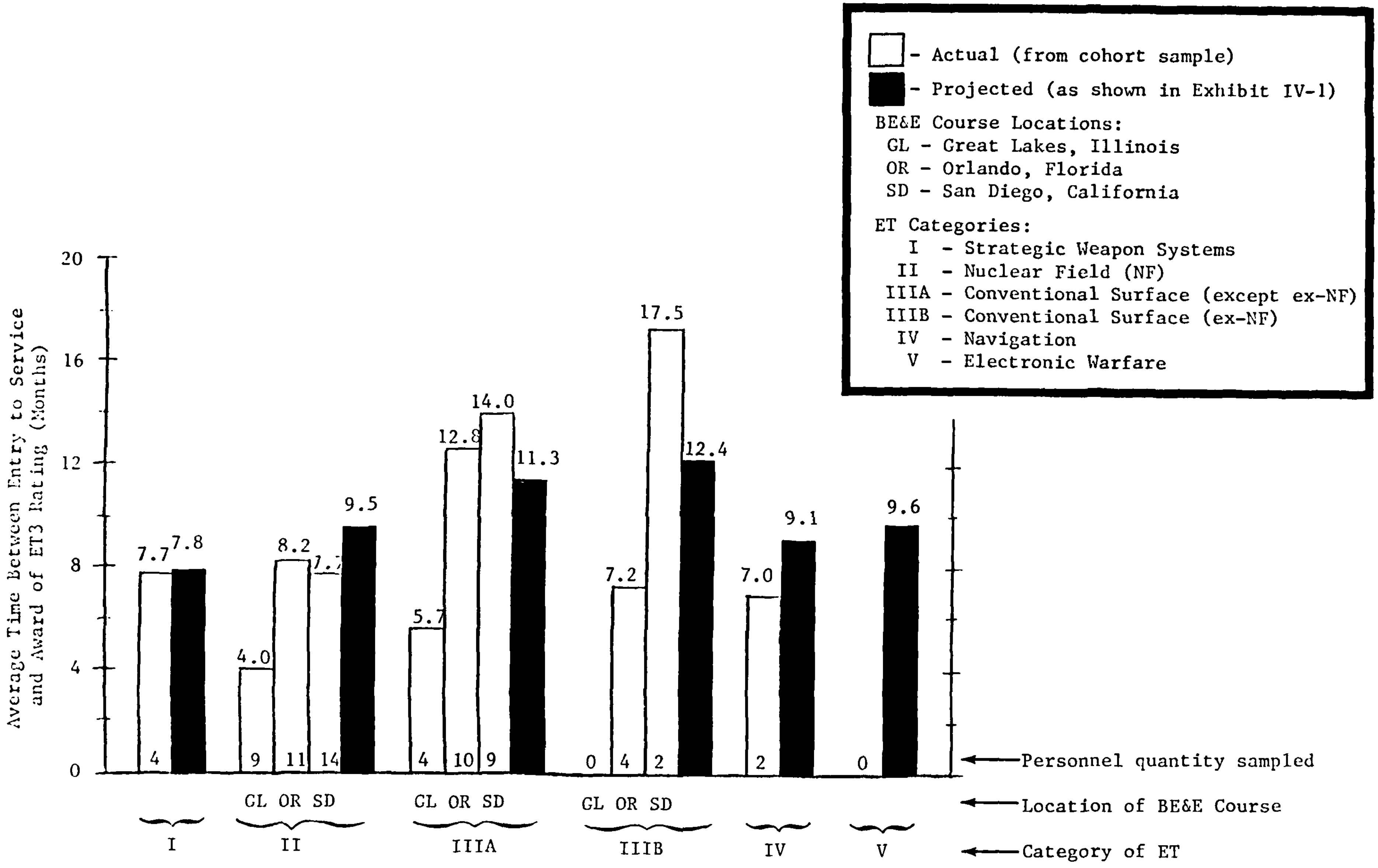


Exhibit V-1. COMPARISON OF ACTUAL VERSUS PROJECTED ET TRAINING PIPELINES BY CATEGORY

the factors mentioned above, differences in personnel data recording procedures at each school location could cause the extreme variation in actual pipeline lengths within a category.

In summary, our sample ET cohort shows that, except for limited instances, individuals are receiving their ratings at approximately the time they would be expected to complete Class "A" School. Overall, of the 69 persons sampled, 48 received their ratings early and 21 late. Early personnel received their ratings in 78 percent of the projected time. Late personnel received their ratings in 114 percent of the projected time. The entire cohort received their ratings in 87 percent of the projected time.

Thus, an evaluation of the October-November 1980 ET cohort shows that the actual and theoretical pipelines are closely aligned. Also, the evaluation showed that ET personnel received their ratings without inordinate delay.

VI. OBSERVATIONS

The Navy training pipeline is complex. Prior to fleet assignment, a new enlistee might attend as many as seven courses located at different schools. Mixing self-paced and group-paced fixed-length courses in the same pipeline can cause scheduling problems and student backlogs. A student may accelerate through one series of self-paced courses, only to have to wait for a start date for the next course if it is group-paced. The efforts of one school to solve its student backlog problem could contribute, however, to a student backlog for the follow-on course at another school. The BE&E/AT Class "A" School situation, discussed in Section III.B, is an example of this need for constant scheduling coordination. The maximum number of class shifts are presently being taught at AT Class "A" School. Any significant increase in the student input rate from previous courses would increase the backlog at Class "A" School.

In addition to alleviating student backlogs, coordination can eliminate redundant or inadequate instruction and can help reduce attrition and time spent in training. The ET pipelines reflect several instances of apparently redundant training. To reinforce the fundamental skills taught in the BE&E course, the Class "A" Schools teach basic electrical principles and refresher mathematics. Although this training appears redundant and increases the time spent in school, it has reduced attrition at the follow-on courses by reinforcing necessary fundamental skills.

Overall pipeline attrition is another factor of considerable importance in the examination of training for critical skills. The estimated FY82 cohort attrition percentages for the six Navy training pipelines included in this analysis were computed and are summarized below:

- Aviation Electronics Technician -- 19.7%,
- Electronics Technician-Advanced Electronics Field, Strategic Weapons Systems Submariner -- 40.4%,
- Electronics Technician-Nuclear Field -- 57.6%,
- Electronics Technician-Advanced Electronics Field, Conventional Surface -- 39.5%,
- Electronics Technician-Advanced Electronics Field, Navigation Submariner -- 50.5%, and
- Electronics Technician-Advanced Electronics Field, Electronic Warfare Submariner -- 40.1%.

Overall attrition figures could key Navy planners to problems in the pipeline as a whole, as opposed to specific courses within a particular pipeline. If overall attrition figures are deemed to be too high, then efforts should be made to determine the exact cause of the attrition. Perhaps entrance requirements for the rating under consideration need to be raised or courses need to be re-evaluated. This would ensure that training funds are expended in a fashion that yields the highest number of qualified sailors at the end of the training pipeline.

The Navy has initiated efforts to improve pipeline management and reduce the time spent at Navy schools. Special attention has been given to those skill areas requiring

electronics training. One key to better pipeline management is a simpler pattern of training: keep the number of courses and the various school locations to a minimum.

APPENDIX A

REFERENCE SOURCES

A. DOCUMENTS

"An Assessment of the Methods Used to Determine Resource Requirements for Enlisted Initial Entry Training," TR-8001-1, MCR, Inc., May 1980.

"An Assessment of the Methods Used to Determine Resource Requirements for Specialized Skill Training," TR-8001-2, MCR, Inc., 30 September 1980.

"Catalog of Navy Training Courses," Naval Education and Training Command, July 1982.

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Memorandum for Assistant Secretary of the Navy (Manpower and Reserve Affairs), "Comments on GAO Draft Report on Backlog of Navy Enlisted Personnel," OP-135B, 27 April 1982.

"Report of the Study Group to Evaluate the Enlisted Training Backlog," Rear Admiral D. L. Freeman (Ret), et al., July 1981.

"Report on Individual Skill Training--Maintenance Training in the Department of Defense," Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), May 1982.

B. INTERVIEWS

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APPENDIX B

RECOMMENDATIONS BY THE NAVY STUDY GROUP IN THE <u>REPORT OF THE STUDY GROUP TO EVALUATE THE ENLISTED TRAINING BACKLOG</u>

The following recommendations were made by the Navy study group and are extracted from the July 1982 report. The purpose of these recommended actions was to alleviate backlogs created by a lack of production capacity in Navy schools (instructor shortage).

RECOMMENDATIONS:

Based on the review conducted, the following actions are recommended:

1. That all effort be expended to obtain the dollars needed to implement the FY83 programmed contractor instruction in FY82 ($13.5 million). If the contracting dollars materialize, allow SSCs to retain and reassign the military instructors to ease the requirements in the local "A" and "C" schools.

2. Take action now to fill all instructor billets in "BE&E," "A" schools and those NEC-producing "C" schools where backlogs exist (in the order listed). In fact, for some period of time, they should be overmanned by some percentage in order to reduce the backlog. This action will not be easy. It will involve a major policy decision to override other policies regarding sea-shore rotation and tour lengths, priorities within priorities, etc. In order to ensure the arrival of instructors at such places as Great Lakes and Memphis, it may be necessary to short-tour personnel at sea at a time when the person's obligated service precludes the option of not reenlisting or applying for the Fleet Reserve. Establish a placement function within NMPC to ensure implementation of this recommendation.

3. For the FY84 budget and beyond, determine the maximum feasible contracting effort related to these schools and include it in the budget submit. This alternative should be accompanied with the provision that when (and if) the enlisted communities "get well," the staff training billets will be reverted to military billets. It would seem appropriate to prioritize the contracting effort according to how critically short the ratings are from which instructors would be required and to expand in geographical areas where enlisted personnel are not willing to go for duty.

4. To the extent that reprogramming is still a possibility, attempt to move some of the expanded FY84 and beyond contract effort into FY83.

5. Initial actions to move the Fleet non-NEC producing "C" and "F" school planning into the same mold as other enlisted training; i.e., fleets submit requirements to resource sponsors who work with OP-12 in the POM process, etc.

6. CNET redirect the efforts of his IG and TAEG assets toward a continual review of schoolhouse operations with emphasis on increased productivity and efficiency with the provision that reports of these agencies be circulated widely within Navy. The long-range effect of this effort would be to allay the suspicions which always arise that manpower resources are not being efficiently employed. It is noted that an overtime measurement system is within CNET's management system, which already substantiates a more than full workweek.

7. That further expansion of the physical training plant facilities at Great Lakes and Memphis be curtailed and that the possibilities of eventual colocation of training near fleet concentrations be considered. It would be much easier to detail Norfolk homeported personnel in a Norfolk or Dam Neck instructor billet than detailing to the two locations mentioned above. The geogrphic stability afforded to the personnel involved could become a deciding factor on a Navy career in future years.

8. "Freeze" course lengths and curriculum expansion until such time as the backlog has been worked off. Except for new systems, the adoption of this recommendation would ensure that more billets would not be required solely because of course "improvements." As the 600 ship Navy approaches, it is envisioned that additional instructors would be required, but that this would be because the number of graduates needed to man the fleet had increased. Desired changes to curriculum which could be traded off with current content which would maintain the same course length and manpower requirements would be expected and acceptable during this time.

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